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Today's Discussion

MODERATOR

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Vanderbilt University Medical Center
Undertreatment of Aortic Stenosis: Where do we stand?
June 21, 2022

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**Disclosures**

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- Medtronic

**Consulting Fees/ Honoraria**
- Cardiovascular Research Foundation
- Edwards Lifesciences
- Medtronic
• Review trends in utilization of AVR for severe symptomatic aortic stenosis (SSAS)

• Discuss drivers of underdiagnosis and undertreatment of SSAS

• Strategize systems of care that would improve recognition and referral for treatment of SSAS
In 2001, 1/3 of patients with severe AS were not treated.

Has widespread adoption of TAVR met the demands of a growing population of patients with AS?
Mass General Brigham experience 2000-2017:

• We identified patients with severe AS (aortic valve area <1cm²) on transthoracic echocardiograms (n=11,993) from 2000-2017 at two large academic medical centers (MGH and BWH).
• AVR utilization investigated among patients with an indication for AVR for severe AS
• Natural language processing (NLP) models were developed and validated to identify symptoms consistent with severe AS and to identify AS-related referral and AVR refusal.
11,993 Patients with index TTE showing AVA <1 cm²

1,198 Patients excluded for missing mAVG or LVEF

Analysis cohort: 10,795 Patients

HG AS (n = 4,558)

HG-NEF (n = 4,009)

No symptoms = 1,738 (43%)

Symptoms = 2,271 (57%)

HG-LEF (n = 549)

No symptoms = 1,982 (42%)

Symptoms = 2,712 (58%)

LG AS (n = 6,237)

LG-NEF (n = 4,694)

No symptoms = 925 (60%)

Symptoms = 618 (40%)

LG-LEF (n = 1,543)

No symptoms = 1,982 (60%)

Symptoms = 2,712 (40%)

Class I Indication for AVR*

Potential Class IIa Indication for AVR*

*Based on the 2014 American Heart Association (AHA) / American College of Cardiology (ACC) guidelines for the management of VHD

Li SX... Elmariah S. JACC, 2022;79:864-77.
Trends in AVR Utilization
Mass General Brigham experience 2000-2017

Class I Indication for AVR for High Gradient AS

HG-NEF (n=2,271)

HG-LEF (n=549)

Potential Class IIa Indication for AVR for Low Gradient AS

LG-NEF (n=2,712)

LG-LEF (n=618)

Li SX... Elmariah S. JACC, 2022;79:864-77.
Trends in AVR Utilization
Mass General Brigham experience 2000-2017

Class I Indication for AVR for High Gradient AS

- HG-NEF (n=2,271)
  - No AVR 688 (30%)
  - AVR 1,583 (70%)

- HG-LEF (n=549)
  - No AVR 256 (47%)
  - AVR 293 (53%)

Severe symptomatic AS

Potential Class IIa Indication for AVR for Low Gradient AS

- LG-NEF (n=2,712)
  - AVR 866 (32%)
  - No AVR 1,846 (67%)

- LG-LEF (n=618)
  - AVR 235 (38%)
  - No AVR, 383 (62%)

Treatment Rate <50%

Li SX... Elmariah S. JACC, 2022;79:864-77.
AVR Associates with Improved Survival Across Spectrum of SSAS

AVR associated with 58% lower adjusted hazard of mortality

AVR associated with 72% lower adjusted hazard of mortality

AVR associated with 27% lower adjusted hazard of mortality

AVR associated with 52% lower adjusted hazard of mortality

Li SX... Elmariah S. JACC, 2022;79:864-77.
## Contributors to AVR Underutilization

**Less likely to get AVR**
- Low mean AVG
- Older age
- Women
- Inpatient TTE
- Low LVEF
- Low hematocrit

**More likely to get AVR**
- CAD
- Smoker

### TABLE 3 OR of Baseline and Echocardiographic Characteristics Associated With Performance of AVR

<table>
<thead>
<tr>
<th></th>
<th>Univariate OR</th>
<th>95% CI</th>
<th>P Value</th>
<th>Multivariate OR</th>
<th>95% CI</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High-gradient AS with Class I indication for AVR</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.972</td>
<td>0.965-0.979</td>
<td>&lt;0.001</td>
<td>0.978</td>
<td>0.971-0.986</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Male</td>
<td>1.283</td>
<td>1.097-1.501</td>
<td>0.002</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>White</td>
<td>1.34</td>
<td>1.007-1.783</td>
<td>0.045</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CAD</td>
<td>1.242</td>
<td>1.057-1.460</td>
<td>0.009</td>
<td>1.759</td>
<td>1.455-2.126</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>DM</td>
<td>1.04</td>
<td>0.840-1.287</td>
<td>0.72</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Smoker</td>
<td>1.816</td>
<td>1.538-2.145</td>
<td>&lt;0.001</td>
<td>1.457</td>
<td>1.209-1.756</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hct</td>
<td>1.069</td>
<td>1.053-1.085</td>
<td>&lt;0.001</td>
<td>1.053</td>
<td>1.035-1.071</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>eGFR</td>
<td>1.012</td>
<td>1.009-1.016</td>
<td>&lt;0.001</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>IP TTE</td>
<td>0.583</td>
<td>0.496-0.686</td>
<td>&lt;0.001</td>
<td>0.773</td>
<td>0.631-0.948</td>
<td>0.014</td>
</tr>
<tr>
<td>LVEF ≥0.5</td>
<td>2.01</td>
<td>1.662-2.431</td>
<td>&lt;0.001</td>
<td>1.713</td>
<td>1.369-2.143</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

| **Low-gradient AS with potential Class IIa indication for AVR in contemporary era (2014-2017)** |               |                 |         |                 |                 |         |
| Age                  | 0.975         | 0.966-0.984     | <0.001  | 0.976           | 0.966-0.986     | <0.001  |
| Male                 | 1.813         | 1.471-2.235     | <0.001  | 1.683           | 1.336-2.119     | <0.001  |
| White                | 1.533         | 1.045-2.249     | 0.029   | -               | -               | -       |
| CAD                  | 1.211         | 0.068-1.487     | 0.068   | 1.369           | 1.084-1.727     | 0.008   |
| DM                   | 1.052         | 0.838-1.321     | 0.662   | -               | -               | -       |
| Smoker               | 1.364         | 1.111-1.674     | 0.003   | -               | -               | -       |
| Hct                  | 1.061         | 1.041-1.082     | <0.001  | 1.041           | 1.019-1.063     | <0.001  |
| eGFR                 | 1.010         | 1.005-1.014     | <0.001  | -               | -               | -       |
| IP TTE               | 0.600         | 0.486-0.741     | <0.001  | 0.687           | 0.539-0.875     | 0.002   |
| LVEF ≥0.5            | 0.945         | 0.739-1.209     | 0.633   | -               | -               | -       |

AS = aortic stenosis; AVR = aortic valve replacement; CAD = coronary artery disease; DM = diabetes mellitus; eGFR = estimated glomerular filtrate rate (mL/min/1.73 m²); IP TTE = inpatient transthoracic echocardiogram; LVEF = left ventricular ejection fraction; mAVG = mean aortic valve gradient.

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Variation in Physician Referral Patterns

< 1 in 3 referred to a HVT member or cardiac surgeon

% of Class I indicated patients that are treated

22%

Increased risk of death for patients managed by cardiologists in the bottom quartile versus the top even when controlling for comorbidities

Top 25% of cardiologists by AVR rate

Bottom 25% cardiologists by AVR rate

Cardiologists ranked by treatment rates of AVR patients

Li SX... Elmariah S. JACC, 2022;79:864-77.
Efforts are needed to:

- Encourage screening of patients at risk of AS (PE and TTE)
- Increase awareness of low-gradient AS
- Clarify echocardiogram reporting of AS
- Bolster transitions of care
- Facilitate referral of patients with AS to Heart Valve Teams
Today's Panel Discussion

PANELISTS

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DETECT AS Study: Electronic Physician Notification to Facilitate the Recognition and Management of Severe Aortic Stenosis:

Consecutive patients with severe AS (AVA <1cm²)
Inclusion Criteria: ≥ 18 years
Exclusion Criteria: mechanical or prosthetic aortic valve

Randomization by provider

470 patients
Control Arm: No intervention

470 patients
Intervention Arm: Physician Notification Letter via email reporting the diagnosis and providing guideline recommendations for further intervention and/or monitoring

Follow-up for 1 year following final patient enrollment.
Primary outcome: AVR utilization
Secondary outcomes: mortality, heart failure hospitalization, TTE utilization/surveillance, AS billing code diagnosis, and cardiology/Heart Valve Team referral.

Timeline
Study Onset: Patient accrual and randomization.
3 years: Outcome measurement.

ClinicalTrials.gov Identifier: NCT05230225
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